

## Chapter 2

### Preparation for a Scale Examination

#### Objectives

After you have studied this chapter, you should be able to:

1. Describe the purpose of scale examinations by weights and measures jurisdictions.
2. Identify references for legal and technical requirements of device inspection.
3. Identify equipment needed for scale examinations.
4. Describe procedures for legal entry into commercial establishments by weights and measures inspectors for the purpose of device examination.
5. Explain the meaning of the following terms:

accurate  
approval seal  
commercial weighing and measuring device  
correct  
primary standards  
secondary standards  
security seal  
specification

These terms are printed in **bold type** when first introduced. Complete definitions are listed alphabetically in Appendix A.

#### General Considerations

##### **Purpose of Device Inspection**

Any commercial transaction that involves sale by weight is subject to error or deception. The primary purpose of a scale examination is to assure that a scale is **accurate** and **correct**:

- To be accurate, a scale must meet, within applicable tolerances, specific performance requirements.
- To be correct, a scale must, *in addition to being accurate*, meet all applicable specification requirements, including those relating to design, selection, installation, use, and maintenance.

## Impact of the Packers and Stockyards Act

In most instances, the regulation of commercial weighing and measuring devices is solely a State or local government responsibility; however, in the case of vehicle scales adapted to weigh livestock, the Federal Government plays an important role. Federal concern in this area stems from the passage of the Packers and Stockyards Act in 1921. This Federal law was prompted by a Federal Trade Commission investigation into the amount of control exercised by the Nation's five largest firms in meatpacking and the marketing of livestock and meat. The law regulates business practices of those engaged in livestock and live poultry marketing and meat and poultry packing in interstate and foreign commerce.

The Packers and Stockyards Act is administered by the U.S. Department of Agriculture (USDA). The USDA agency responsible for carrying out the provisions of the law is the Grain Inspection, Packers, and Stockyards Administration (GIPSA).

GIPSA has its headquarters in Washington, D.C., and also maintains regional offices, each of which is charged with administering the law in a specified area of the country.

The P&S Act applies to those engaged in the business of marketing livestock, meat, and poultry in commerce. This includes: stockyards, commission firms, livestock auctions, order buyers, dealers, meat packers, meat brokers, meat wholesalers and distributors, and live poultry dealers and handlers. Excluded from coverage are farmers and ranchers when buying livestock for their own stocking or feeding purposes or when marketing their own livestock.

Any person or firm subject to the P&S Act and responsible for weighing livestock is charged with installing, maintaining, and operating scales so as to insure accurate weights. In addition, all livestock scales covered by the Act must be tested for accuracy at least every 6 months by a competent scale-testing agency. In many cases, the "competent agency" is the State or local weights and measures office, which conducts the necessary tests as part of its own enforcement program and then shares the information with GIPSA. The frequency of examination of livestock and animal scales by State or local officials varies from jurisdiction to jurisdiction; consequently, in order to meet the 6-month inspection requirement, some scale owners must arrange to have another competent agency, such as a scale company, perform the necessary tests.

Whoever conducts the tests must follow GIPSA approved procedures. Because GIPSA works closely with the National Institute of Standards and Technology (NIST) and the National Conference on Weights and Measures (NCWM), its procedures and scale requirements are, for the most part, consistent with those in NIST Handbook 44 and the Examination Procedure Outlines developed by the NIST Weights and Measures Division. There are, however, a few minor differences (for example, the General Code in Handbook 44 requires that all weighing and measuring devices be provided with indicating or recording elements appropriate in design and adequate in amount; P&SA requirements specify that vehicle scales used for weighing live poultry be provided with indicating and recording elements). To help ensure consistency in the reporting of test results, GIPSA supplies report forms to the States and other testing agencies.

GIPSA staff do not perform the required scale examinations themselves; however, they may conduct direct sale investigations of weighing accuracy. Sometimes, animals are pre-weighed, then "sold" to the market to check reliability of its weighing practices; at other times, checkweighing is used — investigators reweigh animals to see if weights given by the market are consistent and accurate.

Another GIPSA program designed to improve weighing accuracy in the livestock industry is weighmaster training. GIPSA conducts training schools in cooperation with State weights and measures officials to

explain official GIPSA instructions and correct procedures to scale operators and State or local weights and measures inspectors.

Your instructor will describe your jurisdiction's interactions with GIPSA.

## **Legal and Technical Requirements**

It is the duty of a weights and measures inspector to inspect, test, and evaluate all commercial weighing devices for compliance with specifications, tolerances, technical requirements, and manner of use. The laws and regulations of the jurisdiction prescribe the frequency of inspection and establish the basis for approval, rejection, or seizure of inspected scales.

In most cases, the local weights and measures laws and regulations are compatible with those found in NIST Handbook 130, "Uniform Laws and Regulations." The official regulations for scale specifications, tolerances, and other technical requirements are based on NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices."

## **Structure of a Field Examination**

The official field examination of a vehicle or axle-load scale is organized in four phases. They are:

1. The Inspection to determine compliance with specifications and other requirements.
2. The Pretest Determinations to determine tolerance and other appropriate test factors to be applied to the scale.
3. The Test to determine compliance with performance requirements.
4. An Evaluation of Inspection/Test results, followed by acceptance or rejection of the scale.

## **Test Equipment**

An important part of the preparation for a field examination is the assembly of the proper test equipment. The following section reviews and discusses the various pieces of equipment you will need.

### **Equipment List**

The equipment and supplies required for field examinations of vehicle or axle-load scales are:

- test weights and test weight truck with hydraulic boom and/or weight cart for moving and positioning the test weights normally used by your jurisdiction
- tags, seals, and seal press
- record-keeping forms

- safety equipment (hard hat, safety shoes, etc.)
- hand tools (screwdriver, pliers, diagonal wire cutter, etc.)

## Reference Materials

You will need to have the following reference materials with you at the test site:

- the most recent edition of NIST Handbook 44 adopted by your jurisdiction
- Examination Procedure Outlines (EPO No. 13 and EPO No. 13-E)

NIST Handbook 44 contains all specifications, tolerances, and other technical requirements for weighing and measuring devices.

The Examination Procedure Outlines for Vehicle and Axle-Load Scales (EPO No. 13 and EPO No. 13-E) were developed by the Office of Weights and Measures of the National Institute of Standards and Technology. The outlines list the *minimum* inspection and test procedures that should be performed before any official action is taken on a scale. The EPOs, if carefully followed give maximum information with a minimum of time and effort expended on an examination. They provide a convenient checklist that insures against your omitting important steps in the examination.

An excerpt of the Inspection portion of EPO 13 is reproduced in Figure 2-1. All the applicable requirements relating to this part of the examination are listed in logical groupings. The groupings also are organized in an order that generally reflects an efficient and systematic approach to Inspection tasks. The complete EPOs for vehicle and axle-load scales are reproduced in Appendix B. A detailed explanation of the EPOs used for vehicle and axle-load scales will be provided in the next three chapters of this module.

## Test Weights

The following test weights are normally taken to inspect vehicle and axle-load scales:

- A typical “31-pound” field kit
- 50-lb test weights
- 500-lb or 1000-lb test weights

You will be using **field standard weights (secondary standards)** of the jurisdiction that are certified test weights periodically checked against the **laboratory standards (primary standards)** of your jurisdiction. It is your responsibility to maintain the weight standards in proper condition. Procedures for meeting that responsibility will be described by your instructor.

## EPO No. 13

### Vehicle and Axle-Load Scales Mechanical - Analog Indicating (Weighbeams and Dials)

It is recommended that this outline be followed for vehicle and axle-load scales equipped with weighbeams and/or mechanical dials. Requirements that apply only to scales marked with an accuracy class are indicated with an asterisk. Nonretroactive requirements are followed by the applicable date in parentheses.

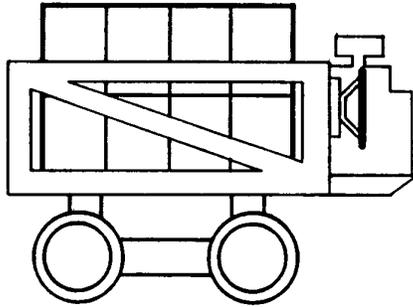
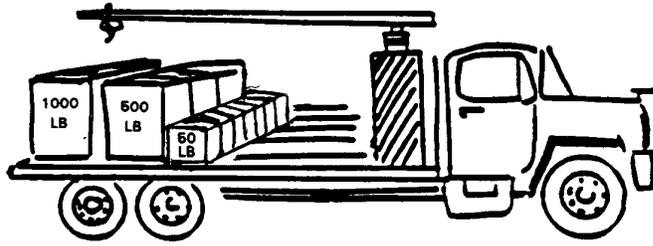
*[See EPO for Safety Notes preceding this excerpt.]*

#### H-44 General Code and Scales Code References

1. Position of equipment.....	G-UR.3.3.
2. Zero-load balance as found. ....	S.1.1., S.2.1.1., S.2.1.2.
If the device is not in balance, the user should be made .....	S.1.5.1., UR.4.1.
aware of paragraph UR.4.1. and a warning issued if necessary.	
3. Indicating and recording elements.	
Weighbeams .....	S.1.5.
Poises.....	S.1.6.
Graduations, indicators, capacity indication .....	S.1.3., S.1.4., S.1.7.
Scale division, value (d) and number(n) .....	S.1.2.* ,S.5.* , UR.1.,
	UR.1.1.(b),UR.1.3. (1/1/86)
Tare division value .....	S.2.3. (1/1/83)
Tare mechanism .....	S.2.3.
Damping means.....	S.2.5.
Adjustable components .....	S.1.10.
4. Suitability .....	S.5.2. (1/1/86)*, UR.1.1.,
	UR.3.1.* ,UR.3.2.,
	UR.3.2.1,UR.3.3. ,UR.3.7.
Customer readability, if applicable .....	G-UR.3.3.
Adjustable components .....	S.1.10.

**Figure 2-1. NIST Examination Procedure Outline 13, Page 2**

50-, 500-, 1000-LB  
TEST WEIGHTS



WEIGHT CART

31-POUND  
FIELD KIT



Figure 2-2. Test Weights

NIST Handbook 44 Scales Code paragraph N.3. and Table T.4. (see Figure 2-3.) specify the minimum test weights and test loads required for in-service tests of scales.

**N.3. Minimum Test Weights and Test Loads<sup>2</sup>.** - The minimum test weights and test loads for in-service tests (except railway track scales) are shown in Table 4. [See Table 4 for footnote <sup>2</sup>.]  
(Added 1984) (Amended 1988)

<b>Table 4. Minimum Test Weights and Test Loads<sup>1</sup></b>			
Device capacity	Minimums (in terms of device capacity)		(where practicable)
	Test weights (greater of)	Test loads <sup>2</sup>	
0 to 150 kg (0 to 300 lb)	100 %		
151 to 1 500 kg (301 to 3 000 lb)	25 % or 150 kg (300 lb)	75 %	Test weights to dial face capacity, 1 000 d, or test load to used capacity, if greater than minimums specified
1 501 to 20 000 kg (3 001 to 40 000 lb)	12.5 % or 500 kg (1 000 lb)	50 %	
20 001 kg+ (40 001 lb+)	12.5 % or 5 000 kg (10 000 lb)	25 % <sup>3</sup>	During initial verification, a scale should be tested to capacity.

<sup>1</sup> If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

<sup>2</sup>The term "test load" means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads.

<sup>3</sup> The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances apply only to the test weights or substitution test load.  
(Amended 1988, 1989, 1994, and 2003)

**Figure 2-3. Minimum Test Weights and Test Loads**

When testing vehicle and axle-load scales with capacities of 20 tons (40,000 lb) or more, you must have the capability to apply a test load of at least 25 percent of scale capacity (see paragraph N.3. and Table 4 in the Scales Code for minimum loads for scales with less than 40,000 lb capacity). The term "test load" means the sum of the field standard test weights and any other applied load used in conducting the test. For a 50 ton (100,000 lb) capacity scale, this means the test load must be at least 25,000 lb.

In nearly all cases, known test weights amounting to the required "test load" value for testing a vehicle or axle-load scale will not be available. Recognizing that limitation, the Scales Code in Handbook 44 requires a minimum of 12.5 percent of scale capacity (or 10,000 lb, whichever is greater) in known test weights. This requirement became mandatory in 1994.

This means, for a 50 ton capacity scale, a minimum of 12,500 lb of known test weights is required. But for dial scales, test weights equal to dial face capacity are required. Dial face capacity is often 20,000 lb.

If you are conducting the first test of a device type that is new to your jurisdiction, you should use standard test weights equal to at least the CLC of the scale so that you can check the validity of the CLC value.

### **Tags, Seals, and Seal Press**

You will use two types of seals: approval seals and security seals. Approval seals mark devices that have been found, upon examination, to be correct. This seal indicates that the device has been approved for commercial use. A security seal is placed on an adjustable element of a device to discourage unauthorized access to and use of the element.

Various designs of security seals are available for securing access to adjustment mechanisms. When the security seal is a lead-and-wire seal, a seal press is used to crimp the lead seal on the wire. The seal press should have a die for the month and year and a die with the symbol of the jurisdiction. Other types of wire seals include metal wires over which metal security clips are clamped (once clamped onto the wire, the metal clips must be destroyed in order to remove them) and plastic wire seals in which plastic wires are threaded through a plastic locking mechanism (once threaded through the mechanism, the mechanism must be destroyed in order to remove the seal) and which are also typically imprinted with serial numbers. Pressure-sensitive security seals are also permitted.

You should be aware that physical seals are not the only approved means of providing security. Handbook 44 permits other means, such as data change audit trails, to be used to discourage tampering with electronic scale equipment. This topic will be discussed in detail in a later chapter.

### **Safety Equipment**

Follow good safety practices during all examination activities. As a minimum, you should wear safety shoes and a hard hat. Your jurisdiction may also require other special equipment, such as eye or ear protection, depending on the test conditions. In addition to following the basic safety practices of your jurisdiction, you should adhere to safety practices of the scale owner.

### **Record Keeping**

Every official action you take as an inspector must be recorded, and reports of that activity are used in different ways depending on the activity. For the examination of vehicle and axle-load scales, you will need to keep records that will identify the scales examined, the findings of the examination, and the action taken.

The NIST Handbook 130 Uniform Weights and Measures Law that has been adopted by most States requires that adequate records be maintained; but only infrequently, if at all, do these statutes describe the details of the records.

It is important to fill out a complete and accurate test report form for each scale examined because of the following considerations.

- It is necessary to have a detailed record of the work performed. In the case of examination of a vehicle or axle-load scale, the form should contain all the information you will later gather when you follow the examination procedure outlines (EPO No. 13 and EPO No. 13-E).
- The owner or operator of the device needs to have a clear understanding of the compliance or noncompliance of his equipment, and the official action taken as a result of the test.
- Your jurisdiction needs a historical record of individual devices and establishments, with necessary data from which statistics may be derived.

You will be able to fill these needs if the form is simple in design, easy to use, and easy to understand. It should be complete and in a suitable form so that it is the primary record; that is, it should not be necessary for someone to copy the report information onto other records, which leads to errors.

At this time, every jurisdiction has different report forms and systems unique to that jurisdiction. Your instructor will explain the use of the report forms for your jurisdiction.

## **Entering A Commercial Establishment**

An official weights and measures examination is a regulatory function, not a testing service. The primary purpose of the examination is to ensure that weighing and measuring equipment is used and maintained in accordance with legal requirements. This examination helps to ensure that consumers receive the correct quantity and quality of products and services for which they pay and businesses receive fair payment for the products and services that they provide. By ensuring that they operate according to a consistent set of weights and measures standards and practices, businesses are also provided with the basis for fair competition among competing businesses.

### **Right of Entry**

You have the authority to enter commercial premises during normal business hours to examine a device. Certain restrictions are imposed to protect the privacy of the device owner. You may enter areas of the premises that are open to the public. (“Public” is defined as those individuals who would be entering the premises to conduct a commercial transaction.)

### **Examples:**

**Vehicle Scale** — You may go into the weigh house to observe or use the indicator, but you cannot go into a private office or storage area without permission.

**Axle-Load Scale** — Offices and storage or maintenance shops should not be entered without permission.

Upon entering the commercial premises, you should ask to see the manager, show an I.D., and explain the intent to examine scale(s) and evaluate them for conformance with legal and technical requirements. If denied entry, you should not argue or insist upon entry, but should explain that authority to enter and conduct a test is granted by jurisdiction law. If still denied entry, you should leave and immediately contact your supervisor. Appropriate legal action may have to be taken.

### **Identification of Scales to be Inspected**

Upon entering a commercial establishment to conduct scale examinations, you may face the problem of determining whether or not a device on the premises is used for commercial purposes. The owner may deny that the device is being used commercially. This problem generally is addressed by jurisdiction statutes under “Presumptive Evidence.”

“Presumptive Evidence” means that if a device is found in a place of business where buying and selling is commonly carried on, the device is a commercial device and is subject to jurisdictional statute. Consider, for example, the scenario in which an inspector finds a second scale in the facility, but the owner says it is no longer being used for commercial transactions since the new scale was installed. If the owner insists the scale is not being used commercially and does not want it checked, he or she has two options:

- The owner may remove the scale from the premises.
- If the owner can prove the scale is not being used commercially (the burden of proof is on the owner), the owner may sign a statement to that effect. If you are certain the scale is not being used commercially, you may place a “not sealed for commercial use” seal on the device.

## **Inspection Checklist**

The following checklist is a guide for points to be considered on entering a commercial establishment.

### *Pre-Entry:*

1. Consider the type of establishment.
  - Is your personal appearance and attire proper for this type of test and/or establishment?
  - Will time of day or week be a problem?
  - Is all necessary equipment available with proper forms and handbooks?
2. Consider the nature of the visit.
  - Scheduled
  - Routine
  - Requested
  - Unannounced
  - Complaint
3. Always conduct yourself in a professional manner. Your job is to protect the *buyer* and the *seller*.

### *Entry And Inspection:*

1. Enter the establishment and politely identify yourself to the management (person in charge).
  - Show your identification.
  - State the nature of the visit.
  - Welcome management to accompany you during the inspection.
  - If moving to another department, identify yourself again to the personnel in that department.
2. Observe layout of premises and location of equipment.
3. Determine type of operation and normal method of use of commercial devices and/or equipment.
4. Consider traffic at the equipment. Be courteous and professional. Attempt to minimize the time the equipment will be tied up for the inspection.
5. Proceed with inspection and testing.

## **Summary**

Vehicle scales in commercial use and axle-load scales used in law enforcement should be examined on a regular basis. An official weights and measures examination is a regulatory function. In most jurisdictions, it is the duty of the weights and measures inspector to examine commercial scales in order to determine if the scales:

- comply with legal specifications,
- deliver accurate weight readings within allowed tolerances,
- meet all technical requirements, and
- are being used in a lawful manner.

A legal scale examination consists of four parts: Inspection, Pretest Determinations, Test, and Evaluation.

Two of the supplies you should have on hand when examining vehicle and axle-load scales are NIST Examination Procedure Outlines (EPO) No. 13 and No. 13-E. The EPO is a checklist for inspection and testing procedures you perform to evaluate the acceptability of a scale.

Other supplies and equipment you will need for an official examination include NIST Handbook 44, adequate field test weights (secondary standards) that have been calibrated for accuracy against the jurisdiction's laboratory (primary) standards, record-keeping forms to record test results, safety equipment, and tags, seals, and seal press to denote the acceptance or rejection of the device.

You have the legal right to enter public areas of business establishments and carry out examinations of scales in commercial use.